

Physical Appearance and Voice in Male-to-Female Transsexuals

John Van Borsel, Griet De Cuypere, and Hilde Van den Berghe

Ghent University Hospital, Ghent, Belgium

Summary: It has been suggested that sex judgments of male-to-female transsexuals based on the voice may be influenced by the physical appearance of the clients. To explore this hypothesis, a listener experiment was designed in which a panel of 22 laypersons and 22 students in speech-language pathology rated the “femaleness” of fourteen male-to-female transsexuals from video-recorded speech samples in three modes of presentation: auditory-only presentation, visual-only presentation, and audiovisual presentation. Results indicate that appearance and voice are indeed interacting factors. Ratings from the auditory-only presentation were significantly lower than ratings from the audiovisual presentation and ratings from the visual-only presentation were significantly higher than those from the audiovisual presentation. It follows that the success of voice training in male-to-female transsexuals is not solely dependent on vocal characteristics and that speech pathologists should consider incorporating physical appearance as a treatment and outcome variable in the voice training of male-to-female transsexuals. **Key Words:** Voice—Transsexuals—Gender—Physical appearance.

INTRODUCTION

Transsexualism is a gender identity problem characterized by a desire to belong to the sex opposite one’s anatomic gender. The prevalence of transsexualism is estimated at 1 in 54,000. Over 75% are cases of males wishing to be reassigned as females.^{1,2} It is generally recognized that speech pathologists can significantly contribute to the reassignment process in transsexuals by helping clients to achieve communication behaviors that do not betray their biologic

sex. In particular, speech pathologists have been called upon to provide voice training in the case of male-to-female transsexuals with the aim of raising the client’s speaking fundamental frequency to a level that is more consistent with the desired gender role. Experiences with voice therapy in male-to-female transsexuals were reported by several authors.^{3–10} In the case of female-to-male transsexuals voice change seems to be less problematic.^{5,7,11,12} In these subjects the desired voice change, i.e., lowering of the voice, usually takes place automatically under the influence of androgen administration, so that voice therapy for fundamental frequency modification is not indicated. A voice assessment and some counseling before the hormone therapy is nonetheless recommended.¹³ Studies that investigated the role of fundamental frequency in gender recognition

Accepted for publication April 30, 2001.

Based on a paper presented at the ASHA Annual Convention, Washington, DC, November 16–19, 2000.

Address correspondence and reprint requests to John Van Borsel, UZ Ghent 2P1 De Pintelaan 185, B-9000 Ghent, Belgium.
e-mail: john.vanborsel@rug.ac.be

in male-to-female transsexuals have indicated that an increase of fundamental frequency to 155 or 160 Hz is necessary for biological males to be perceived as females.^{7,14} It has also been suggested, however, that sex judgments based on the voice may be influenced by factors other than fundamental frequency. One possible influencing factor is the acceptability of the physical appearance of an individual. In the study of Spencer⁷ listener judgments of the speaker's sex and the sexual representativeness of the speech pattern of 8 male-to-female transsexuals were compared to similar measures obtained from samples of the speech of nontranssexual male and female control subjects. Results suggested that a voice need not be entirely representative of males or females in general to elicit a particular sex judgment. In addition, the author felt that the decision about the sex of those subjects whose speech was least representative might have been different had the speaker been visible, with the direction of choice depending on the acceptability of the physical appearance of the individual. Whether physical appearance is a factor in the judgment of a male-to-female transsexual speaker's voice, and to what extent, has, as far as we could ascertain, never been investigated. If physical appearance is indeed a contributing factor to listeners' judgments, then speech pathologists may want to incorporate physical appearance as a treatment and outcome variable in their voice training of male-to-female transsexuals. The present study was meant as a preliminary investigation of the possible interaction between physical appearance and sex judgment from the voice.

PROCEDURE

To investigate a possible interaction between physical appearance and voice in the perception of the sex of male-to-female transsexuals, a study was designed in which a panel of judges rated the "femaleness" of transsexual individuals from videotaped speech samples using three modes of presentation: visual-only presentation (only seeing a subject speak, but not hearing the subject's speech), auditory-only presentation (only hearing a subject's speech), and audiovisual presentation (hearing and seeing a subject's speech). The panel of judges consisted of 22 laypersons (11 females and 11 males) and 22 last year stu-

dents in speech-language pathology (all females), recruited by convenience sampling. The mean age of the judges was respectively 23 years, 9 months (range 20 years, 1 month–30 years, 6 months) and 22 years, 5 months (range 21 years, 3 months – 28 years, 1 month). The judges rated speech samples of 14 transsexuals. These 14 individuals were recruited from the caseload of transsexual patients from the University Hospital gender team. They all had a confirmed diagnosis of male-to-female gender dysphoria and were all native speakers of Dutch. The age of the subjects ranged from 20 years, 4 months to 51 years, 7 months (mean 35 years, 4 months). In 6 of the 14 subjects, gender reassignment surgery was already completed at the time of data collection. None of the subjects except one (S8) underwent voice change surgery (cricothyroid approximation). Voice change surgery had been unsuccessful in this individual, however, and a revision was planned. In 5 of the subjects, speech therapy had been initiated when data were collected. The speech samples consisted of the subjects reading the Dutch version of the text "The north wind and the sun" from the International Phonetic Alphabet.¹⁵ During this reading the subjects, who were all dressed as women, were filmed [Sony Video Hi 8 camera (Sony Corporation, Tokyo, Japan)] in a standardized way: front view with only the head and the shoulders visible. Average fundamental frequency during reading [as determined with the aid of the option "pitch extraction" of the computerized speech lab (CSL) of Kay Elemetrics, Lincoln Park, NJ] ranged from 130 to 207 Hz. Individual subject data on age, surgery, therapy history, and fundamental frequency are shown in Table 1.

The panel of judges rated the femaleness of the subjects on a 10-point equal interval scale, with 1 meaning "not at all female" and 10 meaning "very female." The experiment was designed to control for possible order or sequence effects. The judges were randomly divided into two groups (group 1 and group 2), each consisting of 11 naive observers and 11 students in speech-language pathology. Also, the 14 male-to-female transsexuals were randomly divided into two groups (subjects 1 to 7 and subjects 8 to 14). Each group of judges rated half of the subjects from the auditory-only mode and the audiovisual mode, and half of the subjects from the visual-only mode and the audiovisual mode. As represented in Table 2, group 1 rated subjects 1 to 7 from the audi-

TABLE 1. *Individual Subject Data on Age, Surgery, Speech Therapy History, and Fundamental Frequency (Mean and Standard Deviation)*

Subject	Age (years; months)	Gender reassignment surgery	Voice change surgery	Speech therapy	Fundamental frequency (in Hz) mean (SD)
1	48; 2	Yes	No	No	161 (50)
2	32; 0	Yes	No	No	174 (38)
3	23; 6	No	No	Yes	207 (41)
4	39; 8	No	No	Yes	163 (50)
5	27; 7	No	No	No	185 (54)
6	36; 10	Yes	No	No	142 (27)
7	51; 7	Yes	No	No	130 (44)
8	35; 11	Yes	Yes	No	173 (47)
9	43; 4	No	No	No	134 (56)
10	37; 3	No	No	Yes	161 (44)
11	36; 5	Yes	No	No	176 (59)
12	30; 1	No	No	Yes	167 (34)
13	20; 4	No	No	No	155 (29)
14	32; 5	No	No	Yes	145 (51)

Abbreviation: SD, standard deviation.

TABLE 2. *Design of the Study as to Mode of Presentation and Subjects Rated by the Two Groups of Judges*

Subjects	Judges	
	Group 1	Group 2
Subjects 1 to 7	Auditory only Audiovisual	Visual only Audiovisual
Subjects 8 to 14	Visual only Audiovisual	Auditory only Audiovisual

tory-only mode and the audiovisual mode, and subjects 8 to 14 from the visual-only mode and the audiovisual mode (in that order). Group 2 rated subjects 1 to 7 from the visual-only mode and the audiovisual mode, and subjects 8 to 14 from the auditory-only mode and the audiovisual mode (in that order). An ordinary TV set was used to present the speech samples to the judges. The judges were told that they were going to see speech samples, which they would have to look at and/or listen to carefully, and then

score for femaleness. They were not told that the subjects involved were transsexuals who were biological males. Each sample was presented only once in each presentation mode and was scored immediately after presentation on a scoring sheet. Instructions were repeated before each mode of presentation.

Male-to-female transsexuals sometimes report that in social interactions they betray themselves as biological males only as they start to speak. Also, some clients report that they are more often addressed as males on the phone than in communicative situations where the listener is face to face with them. From these anecdotal clinical reports, it was hypothesized that femaleness would be rated higher when judged from the visual-only mode than from the audio-visual mode and higher when judged from the audiovisual mode than from the auditory-only mode.

ANALYSIS AND RESULTS

Initially, for each subject the average scores assigned by the naive observers and the average scores

assigned by the students in speech-language pathology were calculated separately. However, comparison of the scores of the naive observers with those of the speech-language pathology students showed no significant difference (Wilcoxon signed-ranks test, two-tailed, $p > 0.05$) for any of the modes of presentation. Therefore scores of the two types of judges were pooled in subsequent analyses. In a first analysis the salience of average fundamental frequency as a sex marker was investigated by calculating the relationship (Spearman rank-order correlation coefficient) between average fundamental frequency (see Table 1) and ratings of femaleness from the auditory-only mode of presentation (see Table 3). A moderate to good positive correlation ($\rho = 0.535$; $p = 0.049$) was found. Next we compared the average scores that each subject obtained from the audiovisual mode to those from the visual-only mode (scores assigned by group 2 for subjects 1 to 7 and by group 1 for subjects 8 to 14) and the average scores obtained from the audiovisual mode to those from the auditory-only mode (scores assigned by group 1 for subjects 1 to

7 and by group 2 for subjects 8 to 14). Results are summarized in Table 3

In line with the hypotheses formulated, it was found that for the group of 14 male-to-female transsexuals as a whole, ratings from the visual-only mode tended to be higher (Wilcoxon signed-ranks test, two-tailed $p = 0.064$) than ratings from the audiovisual mode, and that ratings from the audiovisual mode tended to be higher (Wilcoxon signed-ranks test, two-tailed $p = 0.051$) than those from the auditory-only mode. Inspection of the individual results shows, however, that not all subjects complied with these general trends. In 5 of the 14 subjects (S1, S2, S3, S5, and S10) the score from the visual-only mode was lower than that from the audiovisual mode. In the cases of S2 and S5 it seems likely that the higher scores from the audiovisual mode reflect the combined effect of high scores for both voice and physical appearance when rated separately. In the case of S10 the voice plus the physical appearance combined apparently yield a slightly better effect than separately. In the cases of S1 and S3 it would

TABLE 3. *Rating of Femaleness: Average Score Obtained by Each Subject from Each Mode of Presentation*

Subject	Mode of presentation			
	Audiovisual	Visual only	Audiovisual	Auditory only
1	2.5	2.2	3.2	4.1
2	9.5	8.4	8.3	8.4
3	4.4	2.8	4.9	6.5
4	2	6.4	2.6	1.5
5	7.5	6.9	8.5	6.9
6	2.7	5.5	3.9	2.3
7	1.2	2.6	1.5	1
8	3.9	4.8	4.1	2.9
9	1.3	1.7	1.2	1.7
10	3.3	3	3.2	3
11	2.5	4.5	3.9	1.2
12	4.9	7.6	5	3.5
13	6.3	8.3	6.3	5.2
14	3.3	4	3.1	2.1
	M = 3.95	M = 4.91	M = 4.26	M = 3.59

seem that the voice somewhat corrected a less acceptable physical appearance. That the physical appearance was weaker in these subjects is confirmed by the comparison of the scores from the auditory-only with those of the audiovisual mode. Contrary to the general trend for the whole group, S1 and S3 had better scores from the auditory-only mode of presentation than from the audiovisual mode. Apparently, the subjects' physical appearance influenced the judges' perception negatively and yielded a less female impression than the impression that arose from observing their voices only. A similar result was seen in subject S9, who obtained a better score from the auditory-only mode than from the audiovisual mode. This subject was assigned a poor score from the visual-only mode as well.

DISCUSSION AND CONCLUSIONS

The results of the present study confirm that average fundamental frequency is a salient acoustic cue to speaker sexual identity in male-to-female transsexuals. Ratings of femaleness from the auditory-only mode of presentation correlated moderately to well with average fundamental frequency. The results also indicate, however, that average fundamental frequency is not the only contributing factor and that the perception of femaleness created by the voice may be adjusted by other factors. Indeed, as was suggested by Spencer,⁷ physical appearance and voice appear to be interacting factors in listeners' judgment of the femaleness of male-to-female transsexuals. Generally speaking, the male-to-female subjects of the present study obtained better scores for femaleness when judged from the visual-only mode than when judged from the audiovisual mode and better scores when judged from the audiovisual mode than when judged from the auditory-only mode. The common trend seems to be, then, at least for the subjects involved in the present study, that physical appearance positively influences the perception of femaleness while the voice tends to negatively influence the perception of femaleness. To what extent this trend holds for male-to-female transsexuals in general awaits further confirmation from replication studies. Anyhow, it is clear that there are exceptions to this trend. In some of the subjects of the present study, a less acceptable physical appearance (in

terms of femaleness) had a negative effect on the judges' perception. This suggests that acceptability of physical appearance can influence perception of femaleness in both directions.

One implication of this finding is, at any rate, that the success of vocal training in male-to-female transsexuals is not solely dependent on vocal characteristics, and that any assessment of the success of voice training should take into account the possible contribution of a client's physical appearance. Whether or not the increase of fundamental frequency in a particular male-to-female transsexual is sufficient is probably also determined by the acceptability of the client's physical appearance. With a physical appearance that rates high for femaleness an individual with a less female voice may nonetheless be accepted as a woman. Conversely, a female voice does not automatically guarantee that an individual will be accepted as a woman if physical appearance is not acceptable. As acceptability of physical appearance can influence perception of femaleness of the voice, speech pathologists involved in gender teams may consider devoting special attention to training clients with respect to physical markers of femaleness such as in clothing and makeup. Since physical appearance can apparently positively influence listeners' judgment of the femaleness of the voice, extra attention to physical appearance seems worthwhile, particularly in those cases where efforts to alter an individual's voice proved less successful and where other procedures (voice change surgery) are not an option.

REFERENCES

1. Landen M, Walinder J, Lundstrom B. Prevalence, incidence and sex ratio of transsexualism. *Acta Psychiatr Scand.* 1996;3:221-223.
2. Van Kesteren PJ, Gooren LJ, Megens JA. An epidemiological and demographic study of transsexuals in the Netherlands. *Arch Sex Behav.* 1996;25:589-600.
3. Kalra M. Voice therapy with a transsexual. In: Gemme R, Wheeler CC, eds. *Progress in Sexuology*. New York, NY: Plenum; 1977;77-84.
4. Bralley RC, Bull GL, Gore CH, Edgerton MT. Evaluation of vocal pitch in male transsexuals. *J Commun Disord.* 1978;11: 443-444.
5. Battin RR. Treatment of the transsexual voice. In: Perkins WH, ed. *Current Therapy of Communication Disorders: Voice Disorders*. New York, NY: Thieme-Stratton; 1983;63-66.

6. De Vries C, Te Slaa M. Logopedische therapie bij transsexuelen. *Logopedie en Foniatrie*. 1986;58:138–139.
7. Spencer LE. Speech characteristics of male-to-female transsexuals: a perceptual and acoustic study. *Folia Phoniatr*. 1988;40:31–42.
8. Kay J, Bortz MA, Tuomi SK. Evaluation of the effectiveness of voice therapy with a male-to-female transsexual subject. *Scand J Log Phon*. 1993;18:105–109.
9. De Bruin MD, Coerts MJ, Greven AJ. Logopedische therapie bij man-naar-vrouw transsexualiteit. *Logopedie en Foniatrie*. 1995;67:30–34.
10. De Bruin MD, Coerts MJ, Greven AJ. Speech therapy in the management of male-to-female transsexuals. *Folia Phoniatr Logop*. 2000;52:220–227.
11. Hamburger C. Endocrine treatment of male and female transsexualism. In: Green R, Money J, eds. *Transsexualism and Sex Reassignment*. Baltimore, Md: Johns Hopkins University Press;1969:291–307.
12. Colton RH, Casper JK, Hirano M. *Understanding Voice Problems: A Physiological Perspective for Diagnosis and Treatment*. Baltimore, Md: Williams & Wilkins; 1996.
13. Van Borsel J, De Cuypere G, Rubens R, Destaerke B. Voice problems in female-to-male transsexuals. *Int J Lang Commun Disord*. 2000;35:427–442.
14. Wolfe V, Ratusnik DL, Smith FH, Northrop G. Intonation and fundamental frequency in male-to-female transsexuals. *J Speech Hear Disord*. 1990;55:43–50.
15. International Phonetic Association. *The Principles of the International Phonetic Association*. London: Department of Phonetics, University College London; 1949.